The Relationship Between Environmental Sanitation Facilities and the Risk of Stunting at the Pahandut Palangkaraya Community Health Center

Lia Gustri Maulisazen Basuki[1], Ani Margawati[1], Martha Irene Kartasurya[2]

[1]Nutritional Science Departement, Faculty of Medicines, Universitas Diponegoro Semarang, Jawa Tengah, Indonesia
[2]Public Health Departement, Faculty of Public Health, Universitas Diponegoro Semarang, Jawa Tengah, Indonesia

Email corespondence: liaabasuki01@yahoo.com

Track Record Article

Accepted: 24 August 2023
Revised: 28 August 2023
Published: 30 September 2023

How to cite :
Basuki, L. G. M., Margawati, A., & Kartasurya, M. I. (2023). The Relationship Between Environmental Sanitation Facilities and the Risk of Stunting at the Pahandut Palangkaraya Community Health Center. *Contagion : Scientific Periodical of Public Health and Coastal Health*, *5*(3), 1046–1055.

Abstract

Stunting is a picture of stunted growth caused by long-term malnutrition. The prevalence of stunting in Palangkaraya City is 23.59%, and the highest percentage of stunting in Palangkaraya City is in the Pahandut Palangkaraya Health Center (32.37%). One of the factors causing stunting is environmental sanitation facilities that do not meet health requirements. This study aims to determine the risk factors for stunting in environmental sanitation facilities in the working area of the Pahandut Palangkaraya Health Center. The type of research used is an analytical survey with a case-control design. The study was conducted in January-February 2023. The under-five population is 1,499 children. The study subjects were children aged 6-24 months, consisting of 38 stunted and 38 non-stunted children. Child body length data were measured using an infantometer and calculated using anthropometric standard deviation. Data on environmental health facilities were obtained from interviews and observations using questionnaires. The Odd Ratio test analyzed the data. Results of analysis of drinking water sources (OR=2.9, 95%CI=1.086-7.744), clown feces handling (OR=3.03, 95%CI=1.174-7.831), sewerage (OR=3.37, 95CI%=1.17 -7.831), toilet facilities (OR=3.2, 95%CI=1.23-9.23). Drinking water that does not meet health requirements is a risk factor, respondents do not have septic tanks, or sewerage is a risk factor for stunting, private wastewater disposal facilities and toilets that do not meet the requirements, and poor handling of clown faeces is a risk factor for stunting in the work area of the Pahandut Palangkaraya Health Center. Advice for public health centers is expected to monitor newborn children up to the first 1000 days of life to prevent malnutrition that causes stunting and aspects of stunting prevention in children.

Keywords: Environmental, facilities, sanitation, stunting

INTRODUCTION

The period of the first 1000 days of life starts from the beginning of pregnancy until the child is two years old, which is often called the golden age because, during this period, children need nutritional intake according to the child's needs to help the growth and development process (Rahayu et al., 2018; Ashari et al., 2023). Children who do not receive proper nutrition can be at risk of malnutrition, and malnutrition in children, if left in the long term, will hinder their growth, one of which is body length/height. Children with body length/height less than a predetermined standard value by the WHO, namely <-2SD, can be said to be stunting (WHO, 2022).

The prevalence of stunting in Indonesia is higher than in other countries in Southeast Asia, such as Myanmar (35%), Vietnam (23%), and Thailand (16%), and it is ranked fifth in the world. It is estimated that 55% of *stunted* children under five years of age come from Asia, one of which is Indonesia (Kemenkes RI, 2018b). Data on the prevalence of stunting under five collected by the World Health Organization (WHO) shows that Indonesia is included as the third country with a high prevalence of stunting, The condition of stunting in Indonesia is based on the data from the Study on the Nutritional Status of Toddlers in Indonesia in 2022 of 27.67%, which is still relatively high. One of the Indonesian provinces that has the highest stunting rate is Aceh at 35.7%, so Aceh is ranked third nationally for cases of stunting in toddlers, and the district with the highest stunting rate is Subulussalam (47.3%) (Kemenkes RI, 2022).

The *stunting* rate in Central Kalimantan Province is 40% (Kemenkes RI, 2018). Results from the 2019 Indonesian under-five nutritional status study data, show the prevalence of child *stunting* in Palangkaraya City is 23.59% (Sudikno et al., 2019). Had the highest number of *stunting* children under five compared to other health centres, namely 90 children (32.37%), which is still above the WHO standard that an area is categorized as good if the prevalence of stunting under five is less than 20% (Dinkes Palangka Raya, 2021).

Factors that contribute to child growth include the mother's health status and nutritional intake during pregnancy, child feeding practices, infectious diseases, social culture, and environmental sanitation (WHO, 2018). In addition, factors for infectious diseases can be caused by hygiene practices, and poor environmental sanitation causes microorganisms or bacteria to enter the body. In the Pahandut District area, the environmental conditions are located on the banks of the Kahayan River. They are still classified as slums. Most residents dispose of household waste into the river, which can increase environmental pollution, which has the risk of causing infectious diseases, especially toddlers (Dinas Lingkungan Kota Palangka Raya, 2021).

In the Pahandut sub-district of Palangkaraya, 590 children (39.3%) had diarrhea between January and March 2022, while 168 children (11.2%) had acute respiratory infections during the same period. Children who suffer from infectious diseases with conditions that last for a long time and without further treatment can cause children to experience malnutrition and increase the risk of stunting in toddlers (Rahmawati et al., 2020).

This study aimed to determine the risk factors for environmental sanitation facilities that were not good for the incidence of stunting in children aged 6-24 months in the working

area of the Pahandut Palangkaraya Health Center because there was still a stunting rate of 32.37% in that area.

METHODS

This research was an analytical survey with a case-control design using quantitative methods. This study was conducted in the working area of the Pahandut Palangkaraya Health Center, Central Kalimantan, from January to February 2023.

The two-year-old baby population at the Pahandut Palangkaraya Health Center is 1.499 children. Participants in this study were toddlers aged 6–24 months who routinely came to take length measurements every month at the Posyandu, permanently domiciled in the area, were in good health at the time of measurement, and were willing to be respondents. The number of subjects in this study was calculated using the case-control formula, namely:

$$n1=n2 = \{\frac{Z\alpha\sqrt{2PQ} + Z\beta\sqrt{P1Q1+P2Q2}}{(p1-p2)2}\}^2$$

Explanation :

n1=n2	= the minimum number of subjects in the case and control groups
$Z\alpha$	= 1,96
Zβ	= 0,84
P2	= the proportion of exposure in the control group
P1	$= \frac{(OR)P2}{(1-P2)\ x\ (OR.P2)}$
P	$= \frac{P1-P2}{2}$
Q	= 1- P
Q1	= 1- P1
Q2	= 1-Q2

Then, the number of subjects in this study was obtained as many as 38 people in each group with a case-control ratio of 1: 1, so the total subjects in this study were 76 children. The case group was selected based on the following inclusion criteria: children experiencing *stunting*, living in the same place as the control group, mothers willing to be respondents by agreeing to provide informed consent, and not experiencing physical disabilities. The criteria for the control group were that children were not stunted, lived in the same area as the case group, were willing to be respondents and had no physical disabilities, and mothers were willing to be respondents by agreeing to provide consent.

The dependent variable in this study was the incidence of stunting, and the independent variable was environmental sanitation facilities, including the use of drinking water sources, private toilet facilities, handling of clown faeces, and wastewater sewer. Characteristic data, including the sex of the child, the mother's education, and the mother's occupation, were obtained through interviews with respondents.

Data on children's body length were obtained by measuring body length using an assistive device, namely an *olfactometer*, followed by calculating the anthropometric standard deviation using the standard WHO Z-score table (2005). Data on environmental sanitation facilities were obtained through interviews and observations using a structured questionnaire as a reference.

The data was processed using Statistical Program for Social Science 21 software, and then data was analyzed using the odds ratio test to determine the size of the risk factors with a 95% confidence interval (CI) for the incidence of *stunting* in the working area of the Pahandut Palangkaraya Health Center. This study was approved by the Health Research Ethics Commission of the Faculty of Public Health, Diponegoro University, Semarang (number 403/EA/KEPK-FKM/2022).

RESULTS

There were 76 children aged 6-24 months, consisting of 38 *stunted* toddlers and 38 non-stunted toddlers, and their mothers were selected as respondents. Table 1 shows that most of the subjects were male (28.9%), whereas in the case group, 22 (28.9%) were male and 16 (21.1%) were female. There were 36 respondents (47.4%) who did not finish elementary school and did not complete elementary school, while 37 respondents (21.7%) did not work or were homemakers.

Table 1. General Characteristic Frequency Distribution

Respondent Characteristics	Case		Control		Total	
	Amount (38)	**%**	**Amount (38)**	**%**	**Amount (76)**	**%**
Toddler gender						
Man	22	28,9	22	28,9	44	57,8
Woman	16	21,1	16	21,1	32	42,2
Respondent's education						
Did not finish elementary school – elementary school	19	25	17	22,4	36	47,4
Middle School – High School	11	14,5	16	21,1	27	35,6
College	8	10,5	5	6,6	13	17,1
Respondent's occupation						
Laborer/fisherman	15	19,7	5	6,6	20	26,3
Trader	7	9,2	8	10,5	15	19,7
housewife	14	18,4	23	30,3	37	21,7
Government employees	2	2,6	2	2,6	4	5,2

The results of the analysis using the *chi-square* test showed that the variable source of clean water was not related to the incidence of *stunting* (p=0.84), the results of the analysis using the *odd ratio* test obtained a variable which was a risk factor for *stunting* in the working area of the Pahandut Palangkaraya Health Center, namely the source of drinking water (p= 0.05, OR=2.9, 95%CI=1.086-7.744), handling baduta feces obtained OR=3.03 (p=0.03, 95%CI= 1.174-7.831), sewerage obtained OR=3.37 (p=0.02), 95CI%=1.17-7.831), and latrine facilities obtained OR=3.2 (p=0.03, 95%CI=1.23-9.23). **(Table 2)**

Table 2. Analysis of Risk Factors for *Stunting*

Variable	*Stunting*			P-Value	OR	CI 95%
	Case (%)	Control (%)	Amount (%)			
Source of Drinking Water						
meet health requirements	20 (52,6%)	29 (76,3%)	49 (64,5%)	0.054	2.900	1.086-7.744
do not meet health requirements	18 (47,4%)	9 (23,7%)	27 (35,5%)			
Handling of Toddler Faeces						
good handling	11 (28,9%)	21 (25,3%)	32 (42,1%)	0,03	3.032	1.174-7.831
bad handling	27 (71,1%)	17 (44,7%)	44 (57,9%)			
Waste Water Sewer						
meet health requirements	8 (21,1%)	18 (47,4%)	26 (34,2%)	0,029	3.37	1.233-9.237
do not meet health requirements	30 (78,9%)	20 (52,6%)	50 (65,8%)			
Latrines						
meet health requirements	9 (23,7%)	19 (50%)	28 (36,8%)	0,031	3.222	1.207-8.600
do not meet health requirements	29 (76,3%)	19 (50%)	48 (63,2%)			

DISCUSSION

Poor environmental sanitation will increase morbidity and mortality, especially in toddlers who are still vulnerable, the frequency of diarrhea, and other infectious diseases such as respiratory disorders and intestinal worms, which often affect toddler growth (Purba et al., 2020). Several factors, such as the availability of clean water, waste management, latrines, and proper waste disposal sites, are important in preventing children from contracting infectious diseases that can cause *stunting* (Sari et al., 2022).

Source of Drinking Water

Water used for cooking and drinking needs to be sourced from sources that have been tested to be safe for consumption. Sources of drinking water that meet health requirements can be sourced from bottled water or refilled water through a pre-processing or boiling process and stored in a closed container to avoid contamination.

Based on the results of the cross-tabulation analysis, the OR value was 2.9, indicating that under fives who consume drinking water that does not meet health requirements have a 2.9 times greater risk of experiencing *stunting* than children who consume drinking water that meets health requirements. Research conducted by Hasan (2022) in the North Lampung District found that the use of drinking water that did not meet the requirements was 4.62 times more likely to cause children to suffer from *stunting* (OR=4.62).

Drinking water is water consumed and needed by humans daily for activities. According to the Minister of Health, water suitable for drinking, whether treated or not, fulfils health requirements. The requirements for good drinking water for consumption are odourless, tasteless, colourless, not cloudy, and free of bacteria (Permenkes RI, 2010).

Most of the respondents consume good drinking water, which is by health requirements if drinking water is processed and stored in closed containers. Several respondents consumed drinking water from bottled water, refilled water, and reboiled water. Reboiled water sometimes comes from tap water, a drinking water company, or refilled water. Respondents who use drinking water companies do the boiling process first, and some respondents use refilled water but still do it again because they feel that boiled water is safer for consumption and are used to consuming boiled water first.

The findings in this study amounted to 35.7% of the respondents using water that did not meet health requirements in terms of drinking water storage. The respondents should have washed the place where drinking water was stored and left drinking water open. Suppose you do not wash and cover the drinking water reservoirs that have been treated. In that case, vectors (flies, mosquitoes, insects, etc.) are easily infested and at risk of being contaminated by viruses or bacteria. This can cause infectious diseases in people who drink them, especially toddlers, who risk experiencing diarrhea, which impacts *stunting* (Abimayu et al., 2022). Research conducted by Harlina (2021) in Jeneponto District found that children who consume drinking water that does not meet health requirements risk experiencing stunting (OR=2.67).

Handling of Toddler Faeces

Handling a baduta's poop should be done properly, especially for children who use diapers. Before the diapers are disposed of, they should be cleaned first by throwing the child's faeces into private latrines, then wrapped in plastic and immediately disposed of in a closed trash can.

Improper handling of the baduta poop is a risk factor for *stunting* (OR=3.03), and respondents who handle the baduta poop in a bad manner can cause children to be at risk 3.0 times greater for *stunting*. This research is in line with the findings of Dwipayanti et al., (2020)

in the Province of Bali, which found that individuals who do not dispose of infant faeces in latrines are a risk factor for stunting in children (OR=2.90).

Of the respondents, 57.9% reported poor handling of faeces. Respondents have a habit of not cleaning up children's faeces first, and they prefer to throw diapers directly under the house/stream in the belief that dirt will be washed away by river water. Similar to the findings of Herawati (2020) in Samarinda City, the habit of throwing children's faeces directly into the river and throwing them into the trash can is still found without first disposing of them in a latrine that has a catchment for dirt/waste from the latrine.

From the results of interviews with respondents, many parents still did not handle Baduta's poo properly. Respondents who have children using diapers always throw them directly into the river by wrapping them first in plastic because if they use diapers, they do not bother cleaning anymore and prefer to throw them away immediately, but there are still some respondents who clean diapers first; it is just that the garbage is still thrown into the river, which is under the house.

This behaviour can be caused by habits and beliefs, as happened in West Kenya if a child's faeces during breastfeeding are still clean and harmless to the surrounding environment, which is different from the excrement produced by adults; thus, it does not require a special way to dispose of children's faeces/baby (Ellis et al., 2020). The practice of disposing of children's faeces, if not carried out incorrectly, causes humans in the environment to be easily exposed to pathogens from faeces, such as diarrhea, worm infections, pneumonia, and measles, if exposure repeatedly occurs, allowing functional changes to occur in the intestine; therefore, absorption of nutrients is less than optimal and decreases body endurance (Bauza et al., 2017).

Respondents who do not practice good handling of children's faeces can be influenced by knowledge and habits in their environment. Indiscriminate disposal of baduta's poop has become a habit, judging from the environmental conditions where piles of various garbage stagnate under the house, giving rise to an unpleasant odour.

Waste Water Sewer

The living environment can be healthy if it meets the requirements, namely having a closed sewerage channel to the shelter that does not cause stagnant water. Table 2, it shows that wastewater sewer that does not meet the requirements is a risk factor (OR = 3.37 (95% CI = 1.23-9.23), children who live in an environment with Waste Water Sewer facilities that do not meet health requirements are at risk of 3.37 times more likely to suffer from *stunting* than children who live in an environment with an Waste Water Sewer that meets the health requirements. This research aligns with the findings of Lestari (2020) in Kerinci Regency that

respondents with a wastewater sewer that does not meet the requirements are most at risk for children with stunting, with an OR of 62.66.

Household wastewater is the result of wastewater from households that is not human excrement or faeces but only comes from bathroom water, washing clothes, and other activities that use water. This liquid waste may contain small amounts of pathogenic microorganisms, which can harm health.

There is no sewage channel because most of the houses are above the riverbanks; therefore, people in the working area of the Pahandut Palangkaraya Health Center mostly drain and dispose of liquid waste originating from houses, such as washing waste, bathing, and other activities that use water directly down. House. The characteristics of the houses in the area are above a pool of river water, commonly called "lanting house," and most of the houses are made of wood.

The living environment, which is a nesting place for insects that are a source of disease, is open trash cans and sewage drains that do not comply with health requirements. Sewers for wastewater that meet health requirements are not clogged or closed, do not cause standing water, and do not emit an unpleasant odour (Nugraheni, 2012). Behavioural indicators for handling household liquid waste can be seen if the house has separate channels for household liquid waste through infiltration wells and drains and provides and uses a collection of liquid waste by maintaining sewage channels (Fildzah et al., 2020).

The housing conditions in the Pahandut sub-district are almost the same as those found in Belimbing Village, which has the characteristics of the respondent's house in the form of a stilt house so that the respondents are used to disposing of the waste produced directly without considering the impact on health and the environment (Meliyanti, 2018). In the Rancakalong sub-district, 50.7% of the households had unsafe wastewater sewer facilities that could determine the incidence of *stunting* (Nurhayati et al., 2022). Open sewage can contaminate water and soil, causing stagnant water, which becomes a breeding ground for flies or insects and can affect the incidence of diarrhea (Ezugwu et al., 2020).

Latrines

Facilities for healthy latrines are seen in the availability of faeces and human waste storage, such as septic tanks, the use of gooseneck latrines, and the behaviour of family members when urinating or defecating in private latrines. The analysis results obtained an OR value of 3.22, indicating that family latrine facilities that do not meet the requirements are a risk factor for *stunting* in under-fives. Children who live at home with family latrine facilities that do not meet health requirements have a 3.22 times greater risk of experiencing *stunting*

than children who live with family latrine facilities that meet the requirements. This research aligns with findings in the Tasikmalaya Regency conducted by Yogaswara (2022), who found that respondents with poor toilet facilities were 6.18 times more likely to have *stunting* under five.

One living environment is said to be good if there are healthy latrines in every house used by families or individuals to clean themselves and defecate/urinate, which is intended to break the chain of disease transmission in humans (Bhatt et al., 2019). Interview results from respondents indicated that there was no septic tank or sewerage to the wastewater disposal facilities because the settlement is on the banks of a river, so the respondents think that the dirt/waste generated from the house can be carried away directly by the river flow.

The findings obtained by Syam (2020) show that there are still many people carrying out activities on riverbanks because the latrine facilities they have are not available, so faeces that are not accommodated or disposed of carelessly can contaminate water and soil. Slum settlements sometimes ignore healthy latrines and assume they do not affect health. Children who are cared for and raised in households that do not have healthy latrines are vulnerable to exposure to germs from faeces, which can infect the body (Ariana, 2023).

CONCLUSIONS

The source of drinking water does not meet health requirements (OR=2.9, 95%CI=1.08-7.74), poor handling of children's poops using diapers (OR=3.03, 95%CI=1.174-7.831), sewerage does not meet requirements (OR=3.37, 95CI%=1.17-7.831), and latrines that do not meet the requirements (OR=3.2, 95%CI=1.23-9.23) are risk factors for stunting in under-fives in the working area of the Pahandut Palangkaraya Health Center.

Increasing awareness of environmental sanitation that is healthy and good for the health of family members can be achieved through environmental health programs such as providing counselling regarding how to manage waste in residential areas along rivers, conducting gradual monitoring of settlements, and carrying out activities to clean up the living environment regularly.

Advice that can be given by researchers to institutions regarding stunting prevention is to have targets related to clean living behaviour in the surrounding community by providing education on the dangers of children experiencing stunting and aspects of stunting prevention in children.

REFERENCES

Abimayu, L., Sugiarto, & Subakir. (2022). Faktor Risiko Kejadian Stunting Pada Balita di Desa Pandan Sejahtera Risk Factors for Stunting in Toddlers in Pandan Sejahtera Village. *Journal of Healtcare Technology and Medicine*, *8*(2), 1165–1172.

Ariana, R. (2023). Hubungan penggunaan air bersih dan kepemilikan jamban dengan kejadian stunting di kecamatan murung kabupaten murung raya. *Jurnal Cakrawala Ilmiah*, *2*(6), 1–23.

Ashari, R., Basyir, V., Afriwardi, A., Mayetti, M., Yusrawati, Y., & Desmawati, D. (2023). Factors Related to Stunting Incidence in Toddlers Aged 24-59 Months in the Working Area of Kambang Community Health Center, Pesisir Selatan District. *Contagion: Scientific Periodical Journal of Public Health and Coastal Health*, *5*(2), 530. https://doi.org/10.30829/contagion.v5i2.15097

Bauza, V., & Guest, J. S. (2017). The effect of young children's faeces disposal practices on child growth: evidence from 34 countries. *Tropical Medicine and International Health*, *22*(10), 1233–1248. https://doi.org/10.1111/tmi.12930

Bhatt, N., Budhathoki, S. S., Lucero-Prisno, D. E., Shrestha, G., Bhattachan, M., Thapa, J., Sunny, A. K., Upadhyaya, P., Ghimire, A., & Pokharel, P. K. (2019). What motivates open defecation? A qualitative study from a rural setting in Nepal. *PLoS ONE*, *14*(7), 1–15. https://doi.org/10.1371/journal.pone.0219246

Dinas Lingkungan Kota Palangka Raya. (2021). *Laporan Akuntabilitas Kinerja Instansi Pemerintahan*. Dinas Lingkungan Hidup Kota Palangka Raya.

Dinkes Palangka Raya. (2021). *Profil Kesehatan Kota Palangka Raya Tahun 2020*. Dinas Kesehatan Kota Palangka Raya.

Dwipayanti, N. M. U., Sutiari, N. K., Dewiyani, C. I., & Mulyawan, K. H. (2020). Potential Association of Sanitation Factors on Stunting Incidences Among Children Under Age 5 in Bali Province, Indonesia. *Advances in Health Sciences Research*, *22*(Ishr 2019), 24–28. https://doi.org/10.2991/ahsr.k.200215.005

Ellis, A., Mcclintic, E. E., Awino, E. O., Caruso, B. A., Arriola, K. R. J., Ventura, S. G., Kowalski, A. J., Linabarger, M., Wodnik, B. K., Webb-girard, A., Muga, R., & Freeman, M. C. (2020). Practices and Perspectives on Latrine Use , Child Feces Disposal , and Clean Play Environments in Western Kenya. *The American Society of Tropical Medicine and Hygiene*, *102*(5), 1094–1103. https://doi.org/10.4269/ajtmh.19-0389

Ezugwu, E. C., Nwosu, E. N., Omeje, K. O., & Ubani, C. S. (2020). Estimation of Resistant starch, Non-Resistant starch and Total starch of Unprocessed Foods Sourced within Nsukka Town. *EAS Journal of Nutrition and Food Sciences*, *1873*(4), 159–166. https://doi.org/10.36349/easjnfs.2020.v02i04.001

Fildzah, F. K., Yamin, A., & Hendrawati, S. (2020). Perilaku Ibu Dalam Pencegahan Stunting Pada BADUTA. *Jurnal Keperawatan Muhammadiyah*, *5*(2), 272–284. https://doi.org/10.30651/jkm.v5i2.3352

Harlina, H., Hidayanty, H., & Nur, M. I. (2021). Studi Fakor Resiko Kejadian Stunting Pada Balita Di Wilayah Dataran Tinggi Dan Dataran Rendah. *Jurnal Ilmiah Kesehatan Sandi Husada*, *10*(2), 501–510. https://doi.org/10.35816/jiskh.v10i2.634

Hasan, A., Kadarusman, H., & Sutopo, A. (2022). Air Minum, Sanitasi, dan Hygiene sebagai Faktor Risiko Stunting di Wilayah Pedesaan. *Jurnal Kesehatan*, *13*(2), 299. https://doi.org/10.26630/jk.v13i2.2984

Herawati, Anwar, A., & Setyowati, D. L. (2020). Hubungan Sarana Sanitasi , Perilaku Penghuni , dan Kebiasaan Cuci Tangan Pakai Sabun (CTPS) oleh Ibu dengan Kejadian Pendek (Stunting) pada Batita Usia 6-24 Bulan di Wilayah Kerja Puskesmas Harapan Baru , Samarinda. *Jurnal Kesehatan Lingkungan Indonesia*, *19*(1), 7–15.

Kemenkes RI. (2018a). Buletin Stunting. *Kementerian Kesehatan RI*, *301*(5), 1163–1178.

Kemenkes RI. (2018b). *Profil Kesehatan Indonesia 2018*.

Kemenkes RI. (2022). *Buku Saku Hasil Survei Status Gizi Indonesia (SSGI) Tahun 2022*. Jakarta : Kementerian Kesehatan RI.

Lestari, P. A., Dewi, R. S., & Suroso, S. (2020). Faktor Risiko Kejadian Stunting pada Balita di Wilayah Kerja Puskesmas Semurup. *Jurnal Kesehatan Masyarakat Mulawarman (JKMM)*, *2*(2), 58. https://doi.org/10.30872/jkmm.v2i2.4617

Meliyanti, F. (2018). Faktor-Faktor yang Berhubungan dengan Kepemilikan Saluran Pembuangan Air Limbah Rumah Tangga. *Jurnal Aisyah : Jurnal Ilmu Kesehatan*, *3*(1), 87–94. https://doi.org/10.30604/jika.v3i1.87

Nugraheni, D. (2012). Hubungan Kondisi Fasilitas Sanitasi Dasar Dan Personal Hygiene Dengan Kejadian Diare Di Kecamatan Semarang Utara Kota Semarang. *Jurnal Kesehatan Masyarakat Universitas Diponegoro*, *1*(2), 18723.

Nurhayati, A., Wahyuniar, L., Suparman, R., & Badriah, D. L. (2022). Hubungan Antara Faktor Air Minum, Sanitasi Dan Riwayat Diare Dengan Stunting Pada Anak Baduta Di Kecamatan Rancakalong Kabupaten Sumedang 2021. *Journal of Health Research Science*, *2*(02), 104–114. https://doi.org/10.34305/jhrs.v2i02.585

Permenkes RI. (2010). Peraturan Menteri Kesehatan Republik Indonesia Nomor 492/Menkes/Per/IV/2010 Tentang Persyaratan Kualitas Air Minum. In *Peraturan Mentri Kesehatan Republik Indonesia* (p. MENKES).

Purba, I. G., Sunarsih, E., Trisnaini, I., & Sitorus, R. J. (2020). Environmental Sanitation and Incidence of Stunting in Children Aged 12-59 Months in Ogan Ilir Regency. *Jurnal Kesehatan Lingkungan*, *12*(3), 189. https://doi.org/10.20473/jkl.v12i3.2020.189-199

Rahayu, A., Rahman, F., Marlinae, L., Husaini, Meitria, Yulidasari, F., Rosadi, D., & Laily, N. (2018). *Gizi 1000 Hari Pertama Kehidupan*. Yogyakarta : CV Mine.

Rahmawati, L. A., Hardy, F. R., Anggraeni, A., & Purbasari, D. (2020). Faktor-Faktor yang Berhubungan dengan Stunting Sangat Pendek dan Pendek pada Anak Usia 24-59 Bulan di Kecamatan Sawah Besar. *Jurnal Ilmiah Kesehatan Masyarakat*, *12*(2), 68–78.

Sari, H. P., Natalia, I., Sulistyaning, A. R., & Farida, F. (2022). Hubungan Keragaman Asupan Protein Hewani, Pola Asuh Makan, Dan Higiene Sanitasi Rumah Dengan Kejadian Stunting. *Journal of Nutrition College*, *11*(1), 18–25. https://doi.org/10.14710/jnc.v11i1.31960

Sudikno, Irawan, I. R., Setyawati, B., Sari, Y. D., Wiryawan, Y., Puspitasari, D. S., Widodo, Y., Ahmadi, F., Rachmawati, R., Amaliah, N., Arfines, P. P., Rosha, B. C., Pambudi, J., Aditianti, Julianti, E. D., & Safitri, A. (2019). *Studi Status Gizi Balita di Indonesia*. Jakarta : Kementerian Kesehatan RI.

Syam, S., & Anisah, U. Z. (2020). Analisis Pendekatan Sanitasi Dalam Menangani Stunting (Studi Literatur). *Jurnal Sulolipu : Media Komunikasi Sivitas Akademika Dan Masyarakat*, *20*(2), 303–309. https://doi.org/10.32382/sulolipu.v2i20.1745

WHO. (2018). *Reducing stunting in children: equity considerations for achieving the Global Nutrition Targets 2025*.

WHO. (2022). *Global nutrition targets 2025: low birth weight policy brief*. World Health Organization.

Yogaswara, D. (2022). Pemetaan Kasus Dan Faktor Risiko Stunting Di Kabupaten Tasikmalaya Tahun 2019. *Bidkesmas Respati*, *01*, 105–113.